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DOCUMENTS COLLECTION

MWRA POCKET PAL

A Guide To

Facts

Schedules

Terminology

MWRA POCKET PAL

A compendium of

facts, figures, facilities,

science, statistics, schedules,

targets, timelines and

terminology

Dear Reader,

MWRA's job is to deliver water and sewer services to over 2.5 million residents in 61 cities and towns--a complicated and challenging task. Our work intersects a number of disciplines, such as engineering, construction, law, environmental science, public health and government.

It is a continual challenge to stay abreast of the steady stream of new information about MWRA. Even people versed in several areas of expertise often find themselves searching for that certain detail that will brilliantly illuminate a presentation or memorandum. We also need to know that we are talking about the same thing when we use specialized terms to describe MWRA facilities and functions.

We hope this booklet helps. We're especially pleased to have reduced volumes of data into just 25 pages, suggesting that the ABCs of journalism - accuracy, brevity and clarity - should apply to public agencies whenever possible. The material in the Guide is compiled both for MWRA staff and for external audiences, including ratepayers, public officials, media, students and individuals doing business with us.

Will there be updates? That depends upon the response we receive. Don't hesitate to contact the Public Affairs Department at 241-6057 with comments and suggestions.

Sincerely,

Michael P. Quinlin

Michael P. Quinlin
Director of Communications
MWRA

MWRA

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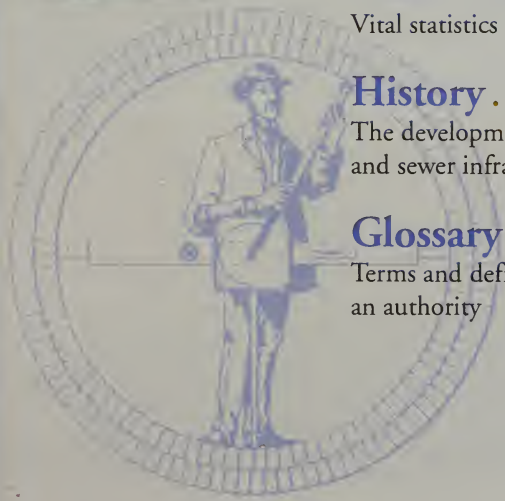

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MWRA

Dates of Note

1984 1985 1986 1987 1988 1989 1990

December 1984, the Massachusetts legislature passes, and signs into law, the MWRA's enabling act.

February 1985, the MWRA Board of Directors is sworn in.

July 1985, the MWRA takes over the water and sewer systems from the Metropolitan District Commission.

November 1986, a long range water supply and demand management program is adopted in lieu of pursuing new supplies.

April 1991, Inter-Island Tunnel construction begins.

December 1991, discharge of sludge from D.I. and N.I. wastewater treatment plants into Boston Harbor is halted. Sludge-to-fertilizer pelletizing begins.

May 1992, Suffolk County House of Corrections demolished to make room for construction of new wastewater treatment facilities.

November 1992, construction begins on the first two batteries of secondary wastewater treatment.

January 1994, permanent sewer metering program completed.

April 1994, local distribution of Bay State Organic, MWRA's fertilizer, begins.

November 1994, Walnut Hill in Marlborough is recommended as preferred site for water treatment plant.

January 1995, the first half of the new primary wastewater treatment plant at Deer Island comes on line.

June 1996, Interim Corrosion Control facility comes on-line.

June 1996, New Neponset Valley Relief Sewer comes on-line.

July 1996, MetroWest Water Supply Tunnel construction begins.

May 1997, Inter-Island Tunnel scheduled for completion.

2004 (pending approval), open distribution reservoirs will be in compliance with drinking water regulations. Open distribution facilities removed from service and replaced with covered tanks.

2004, construction of MetroWest Water Supply Tunnel scheduled for completion.

1992 1994 1996 1998 2000

1991 1993 1995 1997 1999 2001

December 1988, the MWRA stops the inadvertent dumping of scum into Boston Harbor from Deer Island.

February 1990, construction begins on the Sludge-to-fertilizer plant at the Fore River Staging Area in Quincy.

August 1990, Effluent Outfall Tunnel construction begins.

December 1990, construction begins on the Boston Harbor Project, the new wastewater treatment facilities of Deer Island.

March 1993, U.S. Supreme Court upholds Project Labor Agreement for the Boston Harbor Project.

June 1993, consent agreement between MWRA, MDC and DEP allows dual approach for drinking water compliance: filtration and non-filtration.

July 1993, state legislature funds Commonwealth sewer rate relief fund for first time as part of fiscal year 1994 budget.

October 1993, commercial landfill capacity is substituted for a planned MWRA-owned landfill in Walpole.

June 1995, new sewer rate methodology is implemented.

October 1995, federal court agrees to eliminate the construction of battery D from secondary treatment, saving $165 million.

November 1995, the Inter-Island Tunnel boring machine breaks through to the Nut Island shaft in Quincy.

April 1996, proposed downsized CSO schedule and plan accepted by EPA and submitted to federal court in May for approval. Rough savings would be $1 billion.

April 1998, Effluent Outfall Tunnel scheduled for completion.

Late-1999 (pending approval), construction expected to begin on drinking water treatment plant.

December 1999, Boston Harbor Project scheduled for completion.

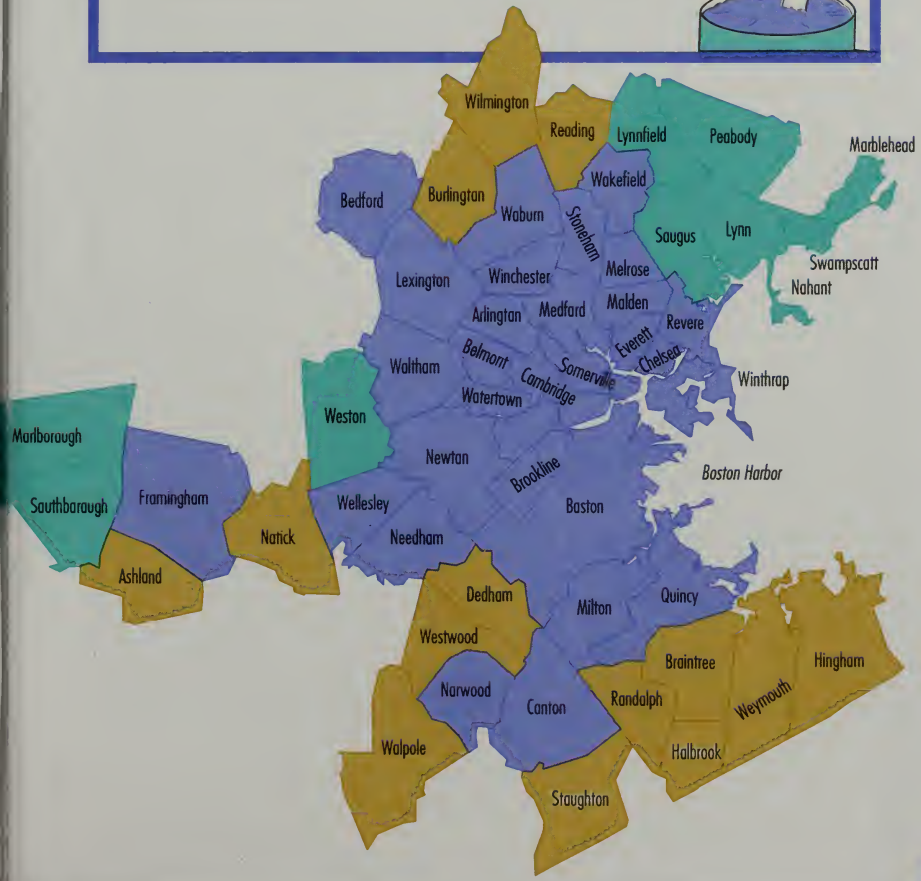
December 2003 (pending approval), construction of drinking water treatment plant scheduled for completion.

General Facts

- 43 sewer customer communities
- 46 water customer communities
- 61 customer communities collectively
- 11 members of the MWRA Board of Directors
- 60 members of the MWRA Advisory Board, a fiscal "watchdog" group for the MWRA's budget and operations
- 2nd largest wastewater treatment plant in the USA (after Detroit) is being constructed on Deer Island
- 8 watersheds drain into Boston Harbor: Winthrop Bay, Mystic River, Charles River, Inner Harbor, Neponset River, Quincy Bay, Weymouth Fore/Back Rivers and Weir River/Hingham/Hull Bays

Water & Sewer Service Community
Sewer Service Community
Water Service Community

- 255 million gallons of water delivered per day (on average)
- 370 million gallons of sewage treated per day (on average)
- 2.5 million people served
- 870,000 households served
- 5,500 businesses served



MWRA

Sewerage Facts

- 240 miles of MWRA sewer interceptors
- 5,400 miles of municipally owned sewer pipes
- 11 MWRA sewer pump stations: Alewife Brook (West Somerville), Braintree/Weymouth (Quincy), Caruso (East Boston), DeLauri (Charlestown), Hayes (Wakefield), Hingham (Hingham), Houghs Neck (Quincy), New Neponset (Canton), Prison Point (Cambridge), Quincy (Quincy) and Squantum (North Quincy)
- 5 headwork facilities: Chelsea Creek (Chelsea), Columbus Park (South Boston), Nut Island (goes on-line Fall 1997, Quincy), Ward Street (Roxbury) and Winthrop Terminal (Deer Island)
- 81 combined sewer overflows exist throughout 4 CSO communities: Boston, Cambridge, Chelsea and Somerville
- 6 chlorinated CSO facilities: Commercial Point (Dorchester), Constitution Beach (East Boston), Cottage Farm (Cambridge), Fox Point (Dorchester), Prison Point (Cambridge) and Somerville Marginal (Somerville)
- 65 miles (approximately) of MWRA sewer pipe are television inspected each year
- 3 sewer interceptor projects are currently under design or construction: Braintree/Weymouth Relief Sewer, Framingham Extension Relief Sewer and Wellesley Extension Sewer Replacement
- 3 wastewater treatment plants: Deer Island (Boston), Nut Island (goes off-line Fall 1997, Quincy) and Clinton (Clinton)

New Deer Island Wastewater Treatment Plant

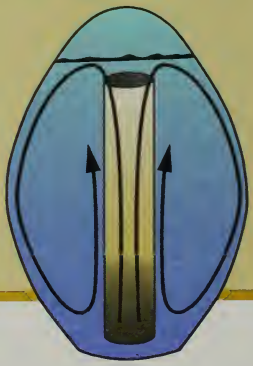
- 2 levels of wastewater treatment: primary and secondary
- 1.27 billion gallons a day (bgd): the peak capacity of primary treatment
- 1.08 billion gallons a day (bgd): the peak capacity of secondary treatment
- 60 percent of the solids and approximately 10 of the toxic pollutants get removed during primary treatment
- 90 percent of the solids and approximately 85 percent of the toxic pollutants get removed during secondary treatment

- 4 clarifier batteries for primary treatment
- 3 clarifier batteries for secondary treatment
- 24 sedimentation tanks in each clarifier battery
- 1 to 2 hours detention time in clarifier batteries for sewage during primary treatment
- 2 hour detention time in clarifier batteries for sewage during secondary treatment
- 2 odor control processes for both primary and secondary treatment: wet scrubbers and carbon filters

MWRA

Boston Harbor Project

- $3.4 billion project to construct new wastewater treatment facilities including:
  - Primary and secondary wastewater treatment facilities
  - Egg-shaped sludge digesters
  - Sludge storage tanks
  - On-site Thermal/Power Plant
  - Effluent Outfall Tunnel
  - Inter-Island Tunnel
  - Odor control facilities
  - South System Pump Station
  - Nut Island Headworks
  - North Main Pump Station (rehabilitated)
  - Disinfection facility
- BHP is an11 year project
- 562 construction companies have worked on the BHP
- 28 local unions have worked on the construction of the BHP
- 3,000 construction workers were employed during peak construction
- Construction materials include:
  - 4,200,000 bricks (roughly enough to cover nearly 10 football fields)
  - 1,500 miles of electric cable (from Boston to Minneapolis)
  - 1 million cubic yards of concrete (enough to repave the 134-mile length of the Massachusetts Turnpike)
  - 813,000 square feet of concrete block (enough to cover 100 baseball diamonds)
- 12 egg-shaped sludge digesters, each:
  - 140 feet tall
  - 720 tons
  - 3 million gallon capacity



Effluent Outfall Tunnel

- 9.5 miles: the length
- 24 feet: the inside diameter
- 420 feet: the depth of the shaft
- 770 tons: the weight of the tunnel boring machine
- 55 diffuser pipes run along the last mile and a quarter
- 1.6 million cubic yards of tunnel muck will be removed from the tunnel
- Longest single entry and exit tunnel in the world

Inter-Island Tunnel

- 4.8 miles: the length
- 11.6 feet: the inside diameter
- 292 feet: the depth of the shaft
- 120 tons: the weight of the tunnel boring machine
- 14 inches: the inside diameter of the sludge lines within the tunnel that will transport sludge from Deer Island to Nut Island (for future transfer to FRSA)
- 200,000 cubic yards of muck will be removed from the tunnel

MWRA

Water Facts

- 129 miles of MWRA water tunnels and aqueducts
- 265 miles of MWRA water distribution mains
- 6,700 miles of municipally owned water distribution pipes
- 5 miles of MWRA water pipe are rehabilitated/relined each year
- 24.6 mile Quabbin Aqueduct
- 8 mile Cosgrove Aqueduct
- 17.8 mile Hultman Aqueduct
- 13.5 mile Weston Aqueduct
- 5.4 mile City Tunnel
- 6.4 mile Dorchester Tunnel
- 17.6 mile MetroWest Water Supply Tunnel
- 14 feet: inside diameter of the MetroWest Water Supply Tunnel
- 600 (plus) valves exercised each year
- 300 million gallons per day: the safe yield of the Quabbin Reservoir
- 186 square miles of land: the Quabbin Reservoir watershed
- 150 feet: the depth of the Quabbin Reservoir
- 4 towns were eliminated by the construction of the Quabbin Reservoir: Enfield, Dana, Greenwich and Prescott
- 108 square miles of land: the Wachusett Reservoir watershed
- 129 feet: the depth of the Wachusett Reservoir
- 2 active source reservoirs: Quabbin and Wachusett
- 5 active open distribution reservoirs: Fells (Fells Reservation, Stoneham/Malden), Nash Hill (Chicopee), Norumbega (Weston), Spot Pond (Stoneham) and Weston (Weston)
- 60 gallons of water per day consumed by the average person

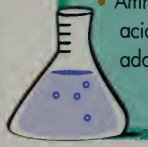
Vital Statistics

Capacity Statistics

- 412 billion gallon capacity at Quabbin Reservoir
- 65 billion gallon capacity at Wachusett Reservoir
- 205 million gallon capacity at Norumbega Reservoir
- 200 million gallon capacity at Weston Reservoir
- 1.9 billion gallon capacity at Spot Pond
- 85 million gallon capacity at Fells Reservoir
- 25 million gallon capacity at Nash Hill

Water Statistics

- 15 parts per billion is the current federal standard for lead in drinking water
- 4 levels of treatment are given to water: natural detention, disinfection, fluoridation and corrosion control
- Ammonia, chlorine, hydrofluorosilicic acid, soda ash and carbon dioxide are added to the water supply



Wholesale Water & Sewer Rate Increases:

- fiscal year 1987 - 54.3%
- fiscal year 1988 - 10.5 %
- fiscal year 1989 - 37.5%
- fiscal year 1990 - 24.2%
- fiscal year 1991 - 8.3%
- fiscal year 1992 - 31.3%
- fiscal year 1993 - 19.4%
- fiscal year 1994 - 4.8%
- fiscal year 1995 - 0%
- fiscal year 1996 - 1.3%

11 MWRA water pump stations:

- Brattle Court (Arlington #1)
- Spring Street (Arlington #2)
- Belmont (Alexander Avenue)
- Newton Street (Brookline)
- Reservoir Road (Brookline)
- Chestnut Hill (not active - Beacon Street)
- Dudley Road (Newton)
- Hyde Park (Hyde Park Avenue)
- Commonwealth Ave.(Newton)
- Spot Pond (Stoneham)
- Lexington Street (Waltham)

Historical Timeline

1877- 1884: The Boston Main Drainage System built

1878: Sewage vats built on Moon Island, Boston

1889: Creation of the Metropolitan Sewer District

1889: The first steam-driven sewage pumping station was built in East Boston

1895: Extension of Boston Main Drainage System to serve adjacent communities on the Charles River

1898: Neponset Valley Sewer District created

1904: Additional sewer outfalls placed off Nut Island

1895: Metropolitan Water District created

1897: Wachusett Reservoir construction begins

1898: Completion of the Sudbury Reservoir, which had been initiated by the City of Boston

1899: Middlesex Fells Reservoir and Gatehouses built

1903: Weston Aqueduct built

1905: Wachusett Reservoir construction completed

1906: Wachusett Dam built

1907: A series of filter beds constructed near Sterling to clean water flowing through that town into the Wachusett Reservoir

Waterworks

Sewerage

1911:
Transmission of electricity from Wachusett Reservoir marked the first known instance of hydro-electric power generation from a domestic water supply

1916 -1921:
Wellesley Extension Sewer (WES) constructed

1919:
The Metropolitan District Commission (MDC) assumed control of the MSD system

1939:
Quabbin Reservoir construction completed

Early 1930:
Braintree/ Weymouth Sewer Interceptor constructed

Early 1940's:
Chlorination facilities built at Weston Reservoir and Framingham Reservoir #1

1940:
Hultman Aqueduct built

1946:
Quabbin Reservoir raised to its full level

Mid-1950s:
Framingham Extension Sewer (FES) constructed

1950's:
City Tunnel built

1952:
Nut Island Primary Wastewater Treatment Plant built

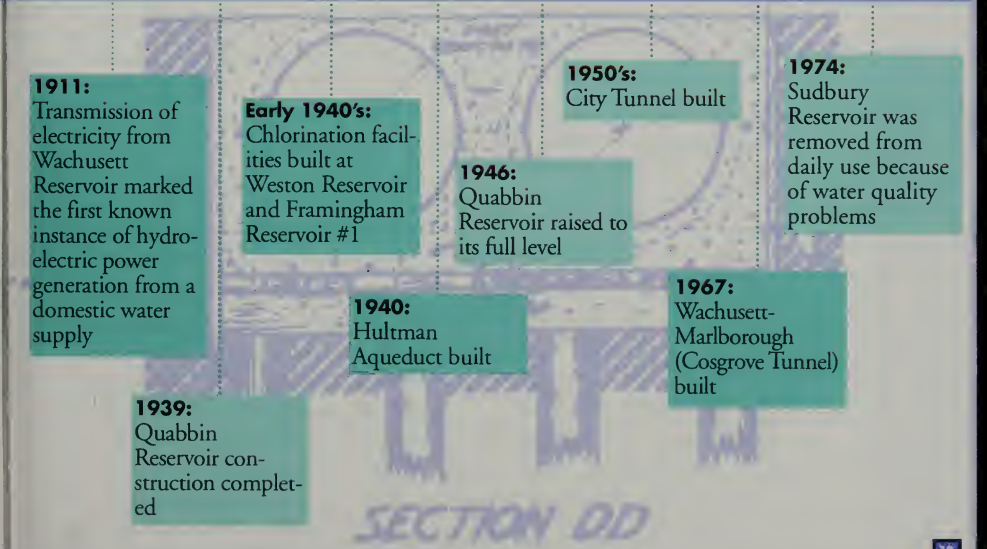
1955 -1963:
Wellesley Extension Relief Sewer (WERS) constructed

1967:
Wachusett-Marlborough (Cosgrove Tunnel) built

1968:
The Deer Island Primary Wastewater Treatment Plant built

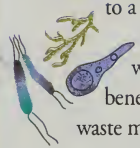
1972:
Federal Clean Water Act established

1974:
Sudbury Reservoir was removed from daily use because of water quality problems



Glossary

Aesthetic pollution - The presence of floating debris and litter, often condoms, tampon applicators and plastics which pass through the sewer system; algal blooms, which can discolor water and cause foul odors; and suspended solids concentrations which reduce water clarity.



Aeration - The process of adding air to a liquid. In secondary treatment, oxygen is added to the wastewater to stimulate the growth of beneficial bacteria that consume waste material.

Area of Critical Environmental Concern (ACEC) - An ecologically valuable area designated by the state for special protection.

Aqueduct - A large pipe, conduit or other channel (open or closed) used for conveying large volumes of water.

Aquifer - A geologic formation that holds groundwater. Many non-MWRA communities rely on wells drilled into aquifers for their drinking water supply.

Bar Screens - A preliminary step in the wastewater treatment process. Wastewater passes through the bars, which are usually 3 inches apart, removing large objects such as rocks, cans, plastic bags, sticks and leaves.

Bay State Organic™ (or sludge-to-fertilizer pellets) - MWRA's trademarked name for its pelletized biosolids fertilizer that is packaged, sold and distributed for use on lawns and gardens.

Biosolids - The organic material derived from wastewater sludge that meets regulatory standards for use as a fertilizer or soil enhancer. Biosolids can be in liquid, dewatered, composted or pelletized form.

Biological Oxygen Demand (BOD) - A measure of the amount of oxygen consuming organic matter in

water. This is a major indicator of pollution because oxygen is needed in the water to support marine life.

Boston Harbor - The estuary into which the Charles, Mystic and Neponset Rivers flow and which now serves as the receiving water for the discharge of treated wastewater from the MWRA plants at Deer Island and Nut Island.

Boston Harbor Project (BHP) - The official name for the construction of MWRA's new sewage treatment plant and related facilities on Deer Island .

Chlorination - Disinfection by adding the chemical sodium hypochlorite.

Clarifier battery - Wastewater treatment takes place in large settling basins referred to as clarifiers or sedimentation tanks. Each clarifier battery contains 24 sedimentation tanks. There are four batteries for primary treatment and three batteries for secondary treatment.

Clean Water Act - In 1972, Congress established a comprehensive, national approach to water pollution control. The amendments listed a number of national objectives, including the elimination of the discharge of pollutants into navigable waters by 1985, and by July of 1977, publicly owned treatment works were to achieve effluent limitations based on a secondary treatment.

Colilert - A testing technique for drinking water samples which provides an *E-coli* absence/presence indication in a water sample in 24 hours.

Combined sewer - A sewer intended to carry both sanitary/industrial wastewater and storm water.

Combined sewer system - A system of conduits in which storm runoff and sewage from homes and businesses are carried by the same pipes.

Combined sewer overflow or CSO (pl., CSOs) - 1. A structure from which wet weather flows, in a combined sewer system, are released directly into receiving waters in order to avoid back-ups into populated areas. 2. The water discharged from a CSO structure.

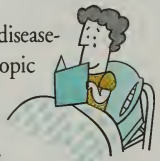
Combined sewer overflow (CSO) activation - The discharge of combined stormwater and sanitary sewage from a CSO into the receiving water.

Combined sewer overflow (CSO) facility - A treatment facility that receives combined sewer overflow and provides screening and/or disinfection prior to discharge into the receiving water.

Conduit - A pipe, canal or passageway for conveying water or sewage.

Conservation - The act of preserving, guarding or protecting a natural resource from loss, decay or violation, as in protecting water supplies from overuse or contamination.

Covered Storage - The MWRA has developed plans to bring its distribution reservoirs into compliance with drinking water regulations by removing all open distribution storage facilities from active service and replacing them with new covered tanks. Most of the open distribution reservoirs will be kept in reserve for emergency use.



***Cryptosporidium* -** A disease-causing protozoa (microscopic organism) which, when ingested, can result in diarrhea and other flu-like symptoms that can last for about nine days. It can pose greater difficulty for people with weakened immune systems such as HIV- infected, chemotherapy or transplant patients.

Customer community - A municipality that receives all or a portion of its water and/or sewer services from MWRA.

Dechlorination - The addition of a chemical (usually sodium bisulfate or sodium thiosulfate) to reduce residual chlorine.

Deer Island Treatment Plant - The centerpiece of the Boston Harbor Project is a new 1.3 billion-gallon-a-day primary and secondary treatment plant for 43 communities. The new plant has replaced the outmoded Deer Island primary treatment plant built in 1968 and will replace the Nut Island primary treatment plant built in 1952. The new plant will ultimately allow the MWRA to meet wastewater treatment standards set by the Federal Clean Water Act.

Demand management - Controlling the demand for a resource such as water, primarily through conservation and careful use.

De-watering - The process of removing a portion of the water from sludge or liquid biosolids by mechanical means, such as centrifuges and belt filter presses.

Disinfection - The final step in the wastewater treatment process, when chlorine or sodium hypochlorite is added to the wastewater to kill disease-causing organisms before discharge.

***E Coli* -** A bacteria that is a primary indicator of fecal contamination in a water supply.

Effluent - The disinfected water leaving a treatment plant after removal of contaminants by the wastewater treatment process.

Effluent Outfall Tunnel - A 9.5-mile undersea tunnel bored through solid rock below the ocean floor which will carry treated wastewater (effluent) from the new Deer Island Treatment Plant to its dispersion point in Massachusetts Bay.

Environmental Impact Report (EIR) - An environmental document developed under the guidelines of the Massachusetts Environmental Policy Act. This document informs the public of the environmental aspects of a project and the specific means and measures to avoid or minimize damage to the environment.

Environmental Notification Form (ENF) - A document with information about a project used to start the Massachusetts Environmental Policy Act (MEPA) process.

Environmental Quality Department (ENQUAD) - MWRA's ENQUAD is responsible for monitoring sewage influent and effluent quality, and the resulting impact of Boston Harbor. Also responsible for the new Central Laboratory on Deer Island and maintaining databases of influent, effluent, sludge quality and harbor and bay environmental quality information.

Estuary - An arm of the sea which reaches inland to meet the mouth of a river where fresh water and salt water mix through the actions of currents and tides.

Executive Office of Environmental Affairs (EOEA) - The office of state government that administers the Commonwealth's laws and policies written to protect the environment. EOEA oversees the Metropolitan District Commission, the Department of Environmental Protection, the Department of Environmental Management, the Department of Fisheries and Wildlife and the Department of Food and Agriculture.

Fecal coliform - Because most pathogens are very difficult to measure directly, their presence is usually inferred from the presence of fecal coliform bacteria which are also found in human and animal waste but are easier to measure. If counts of fecal coliform above state standards are measured by a monitoring agency, beaches are posted as unsafe or shellfish beds are closed until levels fall back down.

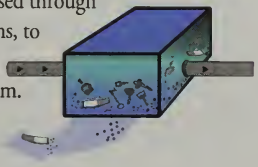
Filtration - The act of passing water through a porous substance such as sand, charcoal or natural materials to remove particles and impurities.

Fiscal Year (FY) - For MWRA, the period between July 1st of a year through June 30 of the following year. Example: July 1, 1997-June 30, 1998 is FY98.

Fore River Staging Area (not Fore River Ship Yard when referring to the BHP) - The principal construction staging area for the Boston Harbor Project and the load-side terminus of the ferry transport system to Deer Island. FRSA (also acceptable) is also the site of the sludge-to-fertilizer plant.

Giardia lamblia - A microscopic parasite which can cause gastrointestinal illness. A giardia infection can be aquired by ingesting food or water which has been contaminated with the parasite or through person to person contact. The parasite multiplies in the small intestine and is passed out with a bowel movement.

Grit chamber - A tank where the flow of wastewater is slowed, allowing heavy solid objects, such as pebbles, sand, coffee grounds and coins which have passed through bar screens, to sink to the bottom.



Grit and screenings - The solid material collected by bar screens and grit chambers at the headworks facilities.

Groundwater - Water that flows through the ground and, if contaminated, can carry pollutants into surface water bodies.

Headworks - Preliminary sewage treatment facilities that remove grit and large objects from the sewage flow before it enters the treatment plant (first stage of primary treatment).

Household Hazardous Waste - Products such as paint, toilet bowl cleaners, used motor oil and pesticides which can threaten human health and the environment when disposed of improperly.

Interim Corrosion Control facility (ICC) - A water quality facility that helps to stabilize both the water's pH and alkalinity by adding substances such as soda ash or carbon dioxide.

Adjusting the acidity of the water will help control the amount of lead which can leach into drinking water at the tap from home service connections.

Infiltration - Groundwater that enters sewers through cracks and faulty joints in pipes and manholes.

Inflow - Surface water, usually from storm runoff, that enters sewers through improper direct connections such as roof drains, storm drains and sump pumps.

Infiltration/Inflow (I/I) - Term given to the two sources of extra water in a sewer system.

Influent - Wastewater as it flows into a treatment plant.

Interceptors - Large regional sewers that collect and transport sewage from local sewer systems to wastewater treatment facilities.

Inter-Island Tunnel (always hyphenated) - A 4.8-mile under harbor tunnel to convey south system flows from Nut Island to the new Deer Island Treatment Plant.

Leak detection - Locating and repairing leaks in any water system in order to reduce water waste and to assure that water reaches its destination.

Low-flow toilets - Toilets that use only 1.5 gallons of water per flush, about 1/4th the amount of water that standard toilets use (4-7 gallons).

Massachusetts Water Resources Authority (MWRA) - An independent state authority created by an act of the Massachusetts Legislature in December 1984, to provide water and sewer services to 61 cities and towns.

Metropolitan District Commission (MDC) - A state agency formed in 1919 to handle, among other functions, water and sewer services for Boston and surrounding cities and

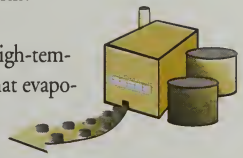
towns. In July 1985, MWRA took over most water and sewer services from MDC. MDC still protects and manages watersheds and performs functions relating to parks and parkways.

MetroWest Water Supply Tunnel (MWWST) - A deep rock 17.6 mile aqueduct which will provide redundancy for the Hultman Aqueduct; construction to begin in July 1996; completion, 2004. The MWWST will run beneath 5 communities: Framingham, Marlborough, Southborough, Wayland and Weston.

National Pollutant Discharge Elimination System (NPDES) - A provision of the Clean Water Act that prohibits the discharge of pollutants into water from wastewater or industrial treatment plants unless a special NPDES permit is issued.

Outfall - Pipe discharging wastewater at a fixed location.

Pathogens (pathogenic microogranisms) - Disease-causing viruses and bacteria enter bodies of water through inadequately treated sewage or raw sewage and from animal and bird waste in storm runoff. They can cause stomach ailments, ear, eye, or skin infections, and even serious diseases such as hepatitis.



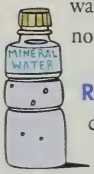
Pelletizing - A high-temperature process that evaporates moisture from de-watered sludge or biosolids to form small, solid pellets.

Percolation - The downward movement of water into underground wells and aquifers; the farther down water percolates, the more it is filtered through rock and soil.

Pre-treatment - Removing heavy metals and other pollutants at their discharge source (i.e. industries) prior to discharging wastewater into the sewer system. The Environmental Protection Agency requires pre-treatment programs for all municipal wastewater treatment plants that receive industrial discharge.

Primary treatment - The stage of the wastewater treatment process which uses gravity to separate sludge (which sinks) and scum (which floats) from wastewater that has entered the treatment plant.

Program Management Department (PMD) - MWRA's PMD provides the management and coordination required for the execution and completion of the Boston Harbor Project, resulting in operable and reliable facilities within the court scheduled deadlines.



Ratepayer - An individual home or business owner who pays the local municipality for water and/or sewer services at a retail rate set by the customer community.

Receiving water - A body of water into which effluent or CSOs are discharged.

Red water - Water that is discolored from low levels of corrosive iron material which builds up along the inside of many antiquated, unlined cast iron distribution mains. This material, if it is disturbed as the result of increased water flows such as main breaks, fire protection flows or flow direction changes, can become suspended in the water, causing a red appearance. It is not a public health threat.

Relief Sewer - A sewer built to carry flows in excess of the capacity of an existing sewer. Required when existing sewers have insufficient capacity and are experiencing back-ups and overflows.

Reservoir - A natural or human made basin where water is collected and stored in large quantities before being supplied to a community.

Residuals - The term commonly given to the solids removed from drinking water or wastewater during the treatment process.

Runoff - Rain and other water that is not absorbed into the soil and instead drains off the surface land.

Safe Drinking Water Act (SDWA) - In June 1986, this federal act was amended to strengthen quality standards for water suppliers. As specified in these amendments, the Surface Water Treatment Rule (SWTR) was promulgated. In June 1993, MWRA, MDC and the Mass Department of Environmental Protection signed a Consent Order which outlines obligations for compliance with the SWTR for the Wachusett Reservoir and several other components of the waterworks system.

Safe yield - The amount of water that a reservoir can provide and still maintain safe delivery levels. Engineers determine safe yield by taking into account the expected rainfall, the size and absorbing capacity of the watershed, the capacity of the reservoir and the amount lost through evaporation. The safe yield of the MDC/MWRA system is 300 million gallons per day.

Sandhog - Any type of a miner, particularly in the Northeast is referred to as a Sandhog. The term originated in New York around 1890 when most of the tunnels being constructed at that time were excavated through sand. Sandhogs are building the MWRA's Effluent Outfall and Inter-Island Tunnels.

Scum - The floatable material in wastewater made up mainly of fats, oil, grease, styrofoam and small bits of plastic that is skimmed off in the treatment process.

Secondary treatment - The stage of wastewater treatment that occurs after primary treatment. A biological process where aeration tanks are used to create a highly controlled environment in which micro-organisms, naturally present in wastewater, consume dissolved organic mattter in primary effluent.

Sedimentation - The process by which gravity causes solid material to settle out of a liquid. In a reservoir, water is allowed to stand long enough for sedimentation to occur, thereby naturally purifying the water.

Sewage (or wastewater) - The used water and added waste of a community which is carried away by drains and sewers.

Sewage system - A system of piping, pumps, basins, tanks, unit processes and appurtenances for the collection, transportation, treatment and discharge of wastewater.

Sewer - A pipe or conduit that carries wastewater or drainage water.

Sewer pump station - A facility that increases the pressure of sewage in a low lying area that has been collected for treatment and pumps it to a location where it can be transported by gravity.

Sewerage - A system of sewers.

Significant Industrial User (SIU) - An industry which discharges an average of 25,000 gallons per day or more of process wastewater to the sewer system (excluding sanitary, cooling and boiler wastewater) and/or an industry that has a reasonable potential for adversely affecting the operation of the sewage system or treatment plant, or violating any pre-treament requirement.

Sludge - The solid waste material that settles out in the wastewater treatment process.

Sludge Digestion - The process by which virtual organisms are used to break down sludge into methane gas, carbon dioxide, solid organic by-products and water.

Sludge-to-fertilizer plant (not Pellet plant or Quincy plant) - The facility at FRSA where liquid biosolids are de-watered and pelletized to make dried biosolids fertilizer.

Storm sewer - A sewer intended to carry only stormwater and surface runoff.

Tide gates - Structures that permit the discharge of wastewater but prevent river or harbor water from entering the sewer system.

Total Suspended Solids (TSS) - A measure of the tiny particles of material, like mud, sand and organic debris, that are suspended in the water but can settle out over time.

Toxic pollutants - Chemicals, such as hydrocarbons, PCBs and pesticides, that become poisonous at high concentrations. Heavy metals can also be toxic at high concentrations including arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, silver and zinc.

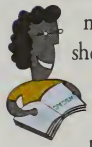
Toxic Reduction and Control (TRAC) Department - MWRA's TRAC department regulates the discharges of toxic contaminants from industrial and other sewer users and develops programs to reduce the contribution of toxics to the MWRA sewer system.

Toxin (noun) - A substance produced by a plant, animal or micro-organism that is capable of causing poisoning when introduced into the body (toxic elements such as mercury, arsenic or other metals are not toxins).

United States Environmental Protection Agency (USEPA) - An agency of the federal government that enforces federal laws written to protect the public health and the environment.

WAC (Wastewater Advisory Committee) - Created in 1990 to offer independent advice to the MWRA on wastewater programs and policies. WAC's membership is designed to reflect the knowledge and interest of major affected constituencies, including engineering and construction, business, industry, planning, academic research and environmental advocacy.

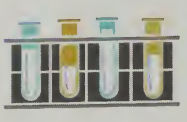
WSCAC (Water Supply Citizens Advisory Committee) - Created in 1977 to provide an ongoing source of public input for the MWRA on water conservation and watershed protection strategies. This committee has members who represent watershed communities, watershed associations, water utilities, environmental groups, business interests and water users.



Wastewater (or sewage) - The water and added waste of a community that is carried away by drains and sewers.

Water quality - The overall health of a water body and its ability to support aquatic life and human uses (swimming, boating and fishing).

Water Treatment Plant - The facilities required to treat potable water (it has not been determined whether a filtration process has to be included as part of the MWRA's proposed new facilities for water treatment).



Water pump station - A facility that increases the pressure of water in a low lying area and pumps it to a higher elevation for distribution.

Watershed - A geographic area in which water, sediments and dissolved materials drain to a common outlet - a point on a river or lake, an estuary (like Boston Harbor) or an ocean.

White water - Water that contains high levels of oxygen causing a bubbly, effervescent appearance. There are no health risks attached to this condition.

Yellow water - Water that is discolored from low levels of corrosion from old cast iron or steel water mains. Most common during the winter months when water demand and use are at their lowest and water travels very slowly through the mains, giving it the opportunity to pick up increased levels of iron. It is not a public health threat.

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